

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:

Confirmation No.: 5527

Gorte, *et al.*

Serial No.: 10/053,085

Group Art Unit: 1795

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Examiner: Wang, Eugenia

For: **USE OF SULFUR-CONTAINING FUELS FOR DIRECT OXIDATION
FUEL CELLS**

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**APPELLANTS' REPLY BRIEF
PURSUANT TO 37 C.F.R. § 41.41**

This Reply Brief is in response to the Examiner's Answer of December 21, 2009. Appellants rely upon the arguments made in the Appeal Brief of December 8, 2009, and the arguments made below.

As Appellants explained in their opening brief (“Opening Br.”), the obviousness rejections in this case are erroneous on several levels and should be reversed. First, the rejections are erroneous as a matter of fact, as the Examiner’s rejections are based on an misinterpretation of the cited prior art. Second, the rejections are erroneous as a matter of law, as the Examiner combined prior art references that teach away from combination with one another and away from the claimed invention. Finally, even if the proposed reference combination were proper, the proposed reference combination does not address every limitation of the pending claims. For these reasons, the Examiner failed to make out a *prima facie* case of obviousness, and the rejections should be reversed.

Insisting that a *prima facie* case of obviousness may be based on improperly combined references, the Examiner's 64-page Answer¹ attempts to sidestep the aforementioned teaching away and to justify the Examiner's erroneous interpretations of the cited prior art and the Examiner's improper reference combination. The Examiner's Answer, however, repeats the same mistakes of fact and of law that were made during prosecution, and cannot rescue the failed *prima facie* case of obviousness. Accordingly, the rejections of claims 2-19, 21-30, 55-56, and 62-64 should be reversed and the pending claims allowed. *In re Oetiker*, 977 F.2d 1443, 1445 (Fed. Cir. 1992) ("If examination at the initial stage does not produce a *prima facie* case of unpatentability, then without more the applicant is entitled to grant of the patent") (emphasis added).

ARGUMENT

The Examiner's Answer is premised on (1) a misreading of the cited art; (2) combining references that teach away from one another; and (3) cherry-picking individual aspects from various proper art references to manufacture a *prima facie* case of obviousness. Every one of these missteps constitutes reversible error.

A. The Examiner Misreads and Misapplies The Cable 903 Reference

As Appellants explained in their opening brief, the Cable 903 reference cannot support the rejections of Appellants claims because the reference criticizes the bonded electrode approach taken by (1) the Isenberg 329 reference that the Examiner attempts to combine with the Cable 903 reference; and (2) the claimed invention (Appellants' Opening Br. at 7-11). Despite the fact Cable expressly criticizes bonded electrodes, the Examiner now suggests that Cable 903 does not criticize the bonded electrolyte approach of Isenberg and of the claimed invention and suggests that Cable 903 discloses bonded electrolyte-anode assemblies. The Examiner's suggestions misread the Cable reference and are contrary to the law of obviousness.

1. Cable 903 Criticizes Bonded Electrodes and Thus Teaches Away From the Isenberg Reference and From the Claimed Invention

The Examiner suggests that the 1993 Cable 903 reference (relied upon in the final rejection) does not criticize the bonded electrode approach of the Isenberg 329 reference (relied upon in the final rejection) because the Cable 903 reference does not mention the Isenberg 329 reference by name (Answer at 28). But given that the Cable 903 and Cable 285

¹ Because the issues presented in this appeal are straightforward, Appellants' opening brief contained only 16 pages of substantive argument. To avoid further burdening the Board, Appellants have also endeavored to minimize the length of this Reply Brief.

references upon which the Examiner has relied throughout prosecution² criticize bonded electrodes at large, it is disingenuous for the Examiner's Answer to suggest that the criticism of bonded electrodes contained in Cable 903 is limited to the Isenberg 766 reference cited therein and does not also include the Isenberg 329 reference. *Cf.* MPEP § 2141.02.VI (“[a] prior art reference must be considered in its entirety, *i.e.*, as a whole, including portions that would lead away from the claimed invention”) (underlining in original) (citing *W.L. Gore & Associates, Inc. v. Garlock, Inc.*, 721 F.2d 1540 (Fed. Cir. 1983)). The Examiner's suggestion that the prior art does not criticize bonded electrodes is further undercut by the fact that the Cable 285 reference – upon which the Examiner has relied throughout prosecution – **continued** to criticize bonded electrodes even after the Cable 903 reference.

While the prior art criticizes bonded electrodes **in general**, the Examiner's Answer suggests this criticism can be overlooked because Cable 903 does not address the Isenberg 766 reference by name (Answer at 26). Such a narrow view of teaching away, however, is contrary to Federal Circuit law, as a teaching away directed only to a general technique or method is relevant. *See, e.g., In re Grasselli*, 713 F.2d 731, 744-45 (Fed. Cir. 1983) (reversing finding of obviousness based on reference combination where first cited reference taught away from generalized method used by second reference).³ The fact that the Cable 903 reference criticizes bonded electrodes in general underscores that Cable (1) teaches away from the Isenberg reference that the Examiner seeks to combine with Cable 903 which the Examiner relies, and (2) teaches away from the claimed invention. The Examiner's attempt to limit the scope of Cable's teaching away is without merit.

2. The Examiner's Reading of the Cable 903 Reference is Impermissibly Speculative and is Inconsistent With the Reference Itself

The Examiner suggests throughout her Answer that Cable 903 is an appropriate reference because it teaches bonding between an electrode and an electrolyte:

² See April 26, 2005 office action; February 9, 2007 office action; May 8, 2008 office action; October 9, 2008 office action; April 10, 2009 office action.

³ If the Examiner's position were controlling law, the concept of teaching away would only come into play when cited Reference 1 criticized cited Reference 2 by name, and would not be implicated if Reference 1 only criticized an approach that Reference 2 happened to follow. This, of course, is not the law. *In re Grasselli*, 713 F.2d 731, 744-45 (Fed. Cir. 1983) (reversing finding of obviousness based on reference combination where first cited reference taught away from generalized method used by second reference).

“As seen in fig. 1 [of Cable ‘903], the solid electrolyte and the anode [4] are placed next to one another (overlap), in physical contact **(and are thus bound to one another)**” (emphasis added) (Answer at 5)

“Fig. 1, which is embodied by Cable ‘903, shows **direct contact between the anode and the electrolyte** as well. **It is noted that such a contact constitutes a bonding of some sort**” (emphasis added) (Answer at 28, 58)

The Examiner’s above-quoted interpretation of the reference lacks factual support and is impermissibly speculative.

Appellants agree that Figure 1 of the Cable 903 reference shows an anode and an electrolyte next to one another. But it is black-letter law that “[o]bviousness cannot be predicated on what is unknown,” *In re Rijckaert*, 9 F.3d 1531, 1534 (Fed. Cir. 1993), and nowhere does the Cable 903 reference state that the anode and electrolyte are **bound** to one another. The reference provides no disclosure regarding bonding between the two elements, and the Examiner’s suggestion that Cable describes anodes and electrolytes bound to one another accordingly lacks factual basis and is based on impermissible speculation. *See In re Robertson*, 169 F.3d 743, 745 (F ed. Cir. 1999) (that a certain feature “may result” is insufficient to support rejection).

The Examiner’s argument is also contrary to the accepted definitions for “contact” and “bound”, as the Examiner’s position effectively requires that “contact” be synonymous with “bound.” Reference to an Internet-based dictionary (wordnetweb.princeton.edu/perl/webwn), however, makes clear that the Examiner’s equating these two terms is incorrect:

Contact: the state or condition of touching

Bound/Bind: adhere; stick to firmly

Accordingly, the Examiner’s suggestion that Cable 903’s disclosure of anodes and electrolytes **in contact** with one another constitutes a disclosure of anodes and electrolytes **bound** to one another is inconsistent with the basic definitions of those terms.

In a further attempt to deflect attention from this erroneous characterization of the reference, the Examiner’s Answer suggests that Appellants are “reading the term ‘bound’ too narrowly” (Answer at 46). But if the Examiner’s Answer were correct that an anode and an electrolyte in contact with one another are necessarily bound together, then the terms “contact” and “bound” would have to be synonymous. As discussed above, however, the

terms “contact” and “bound” have qualitatively different meanings, and the Examiner’s attempt to equate them is based on an overbroad reading of the term “bound.”

The Examiner’s suggestion that Cable ‘903 teaches bonded anode-electrolyte assemblies is also contrary to the reference’s stated goal. As previously discussed, the Cable 903 reference expressly seeks to **avoid** the problems associated with bonding the anode to the electrolyte (Cable ‘903 at col. 2, lines 38-41). The Examiner’s continued suggestion that the Cable ‘903 reference teaches bonded anode-electrolyte assemblies thus cannot be reconciled with the fact that the reference expressly criticizes such assemblies. Because a reference that teaches away from the claimed invention can not render the claimed invention obvious, *W.L. Gore*, 721 F.2d at 1550, the proposed combination is legally improper and cannot support the proposed rejections.

In sum, the Examiner’s suggestions that Cable 903 (1) does not criticize bonded anode-electrolytes; and (2) discloses bonded anode-electrolytes are contrary to the basic dictionary definitions for “bound” and “contact” and are contrary to the Cable 903 reference’s own stated goals. The Cable 903 reference teaches away from the bonded anode-electrolytes of Isenberg and away from the claimed invention, and the reference accordingly cannot support a *prima facie* case of obviousness. See *Ecolocem, Inc. v. Southern Cal. Edison Co.*, 227 F.3d 1361, 1373-75 (Fed. Cir. 2000) (reversing district court’s finding of obviousness where cited references taught away from their combination); *W.L. Gore & Associates, Inc. v. Garlock, Inc.*, 721 F.2d 1540, 1550 (Fed. Cir. 1983) (reversing finding of obviousness where district court erred by “disregarding disclosures in the references that diverge from and **teach away from the invention at hand**”) (emphasis added).

B. The Examiner Misapplies the Keegan Reference

In her Answer, the Examiner concedes that the Cable-Isenberg combination does not address every element of claims 62 and 63, and turns to the Keegan reference to address the claim element of a hydrocarbon having two (2) or more carbons (Answer at 5-6). But Keegan cannot cure the deficiency of the Cable-Isenberg combination because Keegan teaches that hydrocarbon fuels **must** be steam-reformed before use and the claimed invention teaches fuel cells that operate on fuels that are **not** pre-processed (Opening Br. at 14-16).

In her Answer, the Examiner suggests that Keegan is relied upon to provide fuels used in a solid oxide fuel system, and suggests that Keegan is not relied upon to teach a fuel that does not undergo prior treatment (Answer at 51). As Appellants previously explained, however, Keegan only discloses fuel cell systems that operate on steam-reformed (*i.e.*, pre-

processed) fuels, and does not describe or even suggest fuel cell systems that – like the claimed invention – are capable of operation on fuels that do **not** undergo prior treatment. Accordingly, while the Examiner seeks to address Appellants’ claim limitation of untreated fuels with the qualitatively different pretreated fuels of Keegan, the law is clear that obviousness may not be based on addressing a claim limitation by modifying a prior art reference in a way that changes the reference’s mode of operation. *See* MPEP § 2143.01.VI (“[i]f the proposed modification or combination of the prior art would change the principle of operation of the prior art invention being modified, then the teachings of the references are not sufficient to render the claims *prima facie* obvious”).

Furthermore, Keegan teaches that fuels used in fuel cells **must** undergo pretreatment, which pretreatment is performed to “**protect[]** the fuel cell by removing impurities” (Opening Br. at 16, quoting Keegan). Keegan’s teaching that impurities must be removed to protect the fuel cell is contrary to (*i.e.*, teaches away from) the claimed invention’s operation on fuels that are **not** pretreated. *See W.L. Gore*, 721 F.2d at 1550 (reversing finding of obviousness where district court “disregard[ed] disclosures in the references that diverge from and **teach away from the invention at hand**”) (emphasis added). The Keegan reference cannot support the Examiner’s proposed rejections.⁴

C. The Examiner’s Reference Combination is Based on Impermissible Hindsight

Finally, the Examiner’s reference combinations are based on impermissible hindsight because the Examiner selectively plucks individual elements of the references to arrive at the claimed invention while ignoring the references’ content and ignoring controlling law (Opening Br. at 13, 17-18). The Examiner’s Answer does not dispute that such plucking has taken place – despite the fact that Cable 903 expressly cautions against the approach of the Isenberg 329 reference, the Examiner’s Answer states repeatedly that Isenberg 329 reference

⁴ The Examiner suggests that the claim limitation “capable of operating directly with a sulfur-containing hydrocarbon” is immaterial to the present appeal (Answer at 52-53). This is incorrect. First, the 1946 *In re Hutchinson* case upon which the Examiner relies did not hold that the term “capable of” is of no patentable weight. Instead, that case held that particular claim language related to selection of components having the proper size and dimension was of no patentable weight, **not** that the phrase “capable of” itself lacks patentable weight. *See* 69 U.S.P.Q. at 141. In any event, the claimed systems’ ability to operate on sulfur-containing fuel plainly underscores the systems’ nonobviousness over the prior art, as the prior art describes electrodes that degrade when operating on sulfur-containing fuel (see Cable 903) and electrodes that must be “protect[ed]” from sulfur impurities (see Keegan at col. 3, lines 5-15).

“is only being relied upon to provide ceria into the pores for sulfur tolerance purposes” (Answer at 26, 30, 57).

Cherry-picking elements from references without accounting for the entirety of the references is improper. Prior art references must be considered in their entirety, including those portions that teach away from the claimed invention. See *W.L. Gore*, 713 F.2d at 1550. Obviousness rejections cannot be manufactured by pointing to only those aspects of the prior art that are favorable to the rejection and ignoring those aspects of the prior art that teach away from the claimed invention; “[o]ne cannot use hindsight reconstruction to pick and choose among isolated disclosures in the prior art to deprecate the claimed invention.” *In re Fine*, 837 F.2d 1071, 1075 (Fed. Cir. 1988).

In the present case, the Examiner attempts to justify the improper reference combination by suggesting that Cable and Isenberg – despite their teaching away from one another – can be combined because they both deal with sulfur tolerance (Answer at 60) and because the “Isenberg 329 reference is only being relied upon to provide ceria into the pores for sulfur tolerance purposes” (Answer at 26, 30, 57). This is error.

First, as Appellants previously explained, the Cable and Isenberg references teach away from one another at a basic, structural level (see pages 2-5, *supra*). Second, the Cable 285 reference of record in this case (see office actions dated April 26, 2005; February 9, 2007; and May 8, 2008) states that when operated with sulfur-containing fuels, ceria-containing electrodes:

“experienced 4.7% performance loss. Extended operation, or thermal cycling caused the anode coating to crack and flake off, however, and resulted in the poisoning of the underlying bonded anode . . . [a subsequent U.S. Department of Energy] report concluded that cell performance degraded rapidly for about the first two hours of sulfur bearing fuel utilization, and at a slow, linear rate thereafter, in the presence of as low as 2 ppm H₂S in the fuel. Cable 285 at col. 2, lines 14-45.

Accordingly, the Examiner’s suggestion that one of skill in the art would “pluck” ceria from the Isenberg reference for combination with Cable cannot be reconciled with the fact that the Examiner’s own cited art states – by reference to actual test data – that ceria-containing electrodes experienced rapid and continuous performance degradation when exposed to fuels having only trace amounts of sulfur and became degraded upon extended operation. See *W.L. Gore*, 721 F.2d at 1550 (reversing finding of obviousness because district court ignored that prior art taught away from claimed invention). While the Examiner

suggests that one of skill in the art would ignore this express teaching away and then ‘pluck’ ceria from the Isenberg references, the Examiner does not point to evidence to show why one of skill would do so when the evidence of record was that ceria-containing fuel cells performed poorly when exposed to sulfur-containing fuels. *See In re Fine*, 837 F.2d at 1075 (“[o]ne cannot use hindsight reconstruction to pick and choose among isolated disclosures in the prior art to deprecate the claimed invention”). Because the Examiner’s positions are contrary to controlling case law and to the facts of the present case, they are without merit.

CONCLUSION

Applying incorrect legal standards and misreading the cited references, the Examiner’s Answer attempts to justify a *prima facie* case of obviousness that is based on misinterpreting the cited prior art and on combining references that teach away from one another **and** away from the claimed invention. A *prima facie* case of obviousness, however, cannot be based on misinterpreted references or on references that teach away from one another and away from the claimed invention. Accordingly, the Board should reverse the Examiner’s rejections and pass all pending claims to allowance. *See In re Oetiker*, 977 F.2d at 1445 (“[i]f examination at the initial stage does not produce a *prima facie* case of unpatentability, then without more the applicant is entitled to grant of the patent”).

Respectfully submitted,

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